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# FIELDIANA

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### **Mycological Contributions of Rolf Singer: Field Itinerary, Index to New Taxa, and List of Publications**

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## Introduction and Acknowledgments

**R**olf Singer, 1906–1994, was one of the most influential figures in the history of mycology. This volume summarizes many of his contributions to the study of fungi. Chapter 1 provides information on his research program, and Chapter 2 presents his field itinerary. Much of this volume consists of an index to all of the genera, species, and infraspecific taxa described by Singer (2,452 specific and infraspecific epithets distributed in 246 genera). This index includes information on the type specimen, place of deposition, and a literature citation for the type description. The index is followed by a bibliography of his 439 publications.

The authors wish to extend their heartfelt thanks to the following people: Michael Huft for creating the program to convert our dBase records into WordPerfect files; Gail Kushino for help in searching for literature, proof-reading, photocopying, and other miscellaneous but essential tasks; Elizabeth Moore for keying in data and helping assemble the field itinerary; Martha Singer and Meinhard Moser for checking the bibliography; and the librarians at the Field Museum and the Gray and Farlow libraries at Harvard University. We also wish to thank the three anonymous reviewers whose careful reading of this manuscript greatly improved its quality.

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# Summary of Rolf Singer's Contributions to Mycology

*Gregory M. Mueller*

*Qiuxin Wu*

Rolf Singer, 1906–1994 (Fig. 1), was one of the most influential figures in the history of mycology. This brief chapter distills the collections of facts presented in the rest of this volume in an attempt to synthesize the impact that Rolf Singer had on our knowledge of fungi. Two interesting works by Martha Singer, Rolf's wife and companion of 60 years, provide additional information on his life (M. Singer, 1979, 1984). Several memorials on Rolf Singer have also been published (e.g., Mueller, 1994, 1995; M. Singer, 1994). These papers provide the historical backdrop to the discussions presented below.

While the bulk of Singer's papers dealt with the systematics of Agaricales and related taxa, he also profoundly influenced our knowledge of mycogeography, fungal ecology, and ethnomycology. Contributions to these four topics make up the vast majority of his 439 papers and books (Fig. 2). However, he also published on other topics, including fossil fungi (Singer, 1957e, 1958j, 1990f), polypores (Singer, 1941a, 1943d, 1944b), human pathogens (Singer, 1955g, 1958q), and mountaineering (Singer, 1942e, f). (Complete citations to the papers cited here may be found in Chapter 4.) Singer's first five papers were published in 1922, when he was 16 years old. He continued publishing at an impressive pace for the next 70 years (Fig. 3).

During his career, Singer held academic positions on three continents and traveled extensively throughout the Americas, Europe, and parts of Asia. He also made one trip to North Africa. A detailed itinerary of his collecting expeditions, along with a listing of the countries in which he undertook fieldwork, appears in Chapter 2. These travels left a lasting impression on Singer and pro-

vided him with a unique perspective. He developed an unequaled, worldwide knowledge of the Agaricales, and this, coupled with his keen mind and sharp eye, made him uniquely qualified to influence mycology.

## Systematics and Nomenclature

Singer is probably best known for his impact on the systematics and nomenclature of Agaricales and related taxa. His monumental *The Agaricales in Modern Taxonomy* (Singer, 1986a) has appeared in four editions and is almost universally used as the "accepted" classification of mushrooms and their relatives. His monographs and revisions are often the only modern treatment for many genera.

Singer's role in documenting fungal biodiversity is also unequaled, and he revolutionized what we know about Agaricales in South and Central America. Seventy-four of the 230 genera included in the fourth edition of *The Agaricales in Modern Taxonomy*, or nearly a third of the accepted genera, were proposed by Singer and his colleagues. He also proposed genera in families not treated in *The Agaricales in Modern Taxonomy*, bringing the total new genera to 82 (Table 1). Additionally, he published 2,452 specific and infraspecific epithets distributed in 246 genera (Fig. 4). Type localities for these new taxa occur in 56 countries or possessions (Table 2). However, 85% of them were originally described from the Americas, with Argentina, Bolivia, Brazil, Chile, Colombia, Mexico, and the United States together accounting for 75% (Fig. 5). Holotypes of these new taxa are housed in 40 herbaria throughout the world (Table



Figure 1. Rolf Singer proofreading manuscript pages of the 4th edition of *The Agaricales in Modern Taxonomy* in his office at the Field Museum of Natural History, circa 1985. (Courtesy of Field Museum of Natural History.)

3). Most of the specimens, however, can be found in a relatively few herbaria (Fig. 6). Chapter 3 consists of an index to the genera, species, and infraspecific taxa described by Singer. This index includes information on the type specimen, place of deposition, and a literature citation for the type description.

Singer also influenced the systematics community through his work on botanical nomenclature. He attended most of the International Botanical Congresses from the 1950s on, and he was a long-standing member of the Nomenclature Committee. His publications on the subject ranged from proposals for conservation of names (e.g., Singer, 1946b, 1961j, 1967g) to major discussions of the implications of rule changes (e.g., 1948e, 1950l, 1960g, 1965g, 1983d, 1984e, 1986b, f, 1987d).

## Ecology

Singer's contributions to our knowledge of the biogeography and ecology of fungi were also extremely significant. His publications in these areas

were often the first, or among the first, investigations on the subject. He and his colleagues produced ground-breaking studies on the occurrence and importance of mycorrhizae in various forest types in temperate and tropical South America (e.g., Singer, 1959j, 1960k, 1963i, 1964g, 1971c, 1983f, 1989d). His work along the Amazon and Rio Negro in Brazil helped document the different forest types in the region and the role of fungi in the health and functioning of these systems (1978e, 1984b, c, 1986c, 1988c). He also carried out one of the first detailed community analysis studies on mushrooms in the Americas (Singer, 1965i). Although he published few papers dealing solely with biogeography (e.g., Singer, 1955h, 1967f, 1988f), he included information on biogeography in many of his monographs and regional treatments.

## Ethnomycology and Mushroom Cultivation

Singer's mycological interests also included hallucinogenic and edible fungi. He played an ac-





Figure 2. Books and bound publications of Rolf Singer, as displayed during his 80th birthday testimonial dinner at the Field Museum of Natural History in 1986. (Courtesy of Field Museum of Natural History.)

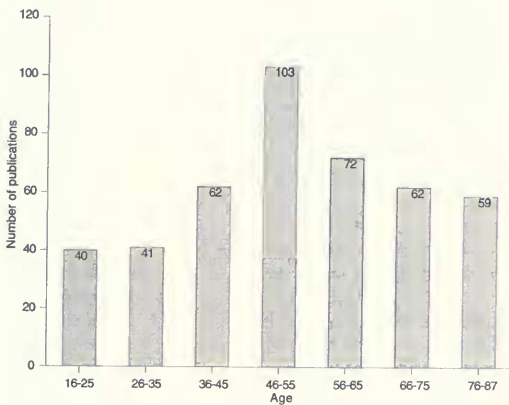


Figure 3. Number of publications of Rolf Singer by age. Singer's first scientific publications appeared in 1922, when he was 16 years old. This publishing effort peaked in his late 40s and early 50s, when he published 103 works in a span of 10 years. In total, Singer published 439 scientific papers or books.

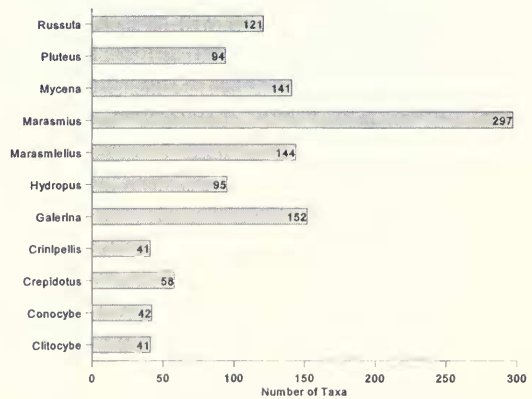


Figure 4. Genera in which Singer and associates described at least 40 new taxa. Singer and associates described 2,452 specific and infraspecific taxa. These were classified into 246 genera. He described 40 or more taxa in 11 of these genera, which account for 50% of his new taxa.

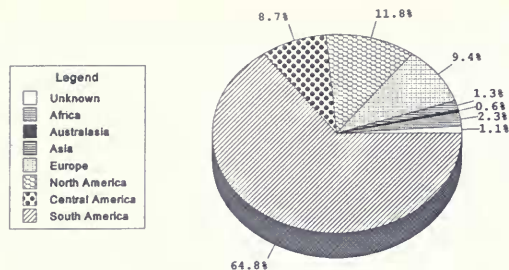


Figure 5. Geographic distribution of Singer's type specimens. Type localities for Singer's new taxa occur in 58 countries or areas. Over 85% of these taxa were described from North, Central, and South America, with Argentina, Bolivia, Brazil, Chile, Colombia, Mexico, and the United States accounting for 75%. Descriptions of 1.1% of the taxa do not include data on the country of origin.

tive role in the identification of the hallucinogenic fungi used in Mexico and in subsequent physiological, ecological, and cultural studies of these fungi (e.g., Singer, 1957f, 1958h, r). Other papers on hallucinogenic fungi include Singer, 1959h, 1960j, and 1978g. He also was active in the study of the cultivation and utilization of edible mushrooms (e.g., Singer, 1961g, 1964i, 1987a).

A summary of his publications does not fully document the impact that Rolf Singer had on mycology. He was an active correspondent, and he responded promptly to the numerous requests for assistance and information. Numerous mycologists had the pleasurable and rewarding experience of working with him in the field, and he facilitated the research of many mycologists, botanists, and zoologists working in the Neotropics.

His presence in mycology will live on through the incredible legacy that he left for us. We hope that the contributions included in this volume will help current and future mycologists tap this wealth of information.

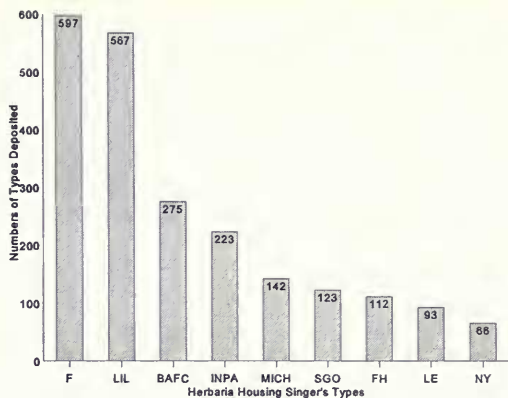


Figure 6. Herbaria with large holdings of Singer's type specimens. Singer's holotypes are preserved in 40 herbaria throughout the world. He consistently deposited type material in the institution where he was working. In some cases, parts of the holotype or paratypic material for South American material are also housed in F, FH, K, or MICH. Although Singer's holotypes are scattered throughout the world, most are concentrated in the herbaria shown in this figure.

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TABLE 1. List of new genera published by Rolf Singer.

Genus	Type species basionym	Citation with page no.*
<i>Amparoina</i>	<i>Marasmius spinosissimus</i> Singer	1958a: 110
<i>Amyloflagellula</i>	<i>Cyphella pulchra</i> Berk. & Br.	1966a: 14
<i>Aphyllotus</i>	<i>A. campanelliformis</i> Singer	1973d: 29
<i>Arthrosporella</i>	<i>Armillariella ditopa</i> Singer	1970a: 17
<i>Asterotus</i>	<i>Panus dealbatus</i> Berk.	1943c: 161
<i>Austrogaster</i>	<i>A. marthae</i> Singer	1962a: 57
<i>Baeospora</i>	<i>Collybia myosura</i> Fr. <i>sensu</i> Quél. & Ricken	1938a: 191, 193
<i>Boletochaete</i>	<i>Boletus spinifer</i> Pat. & Baker	1944a: 358
<i>Bondarzewia</i>	<i>Polyporus montanus</i> Quél.	1940: 4
<i>Brauniellula</i>	<i>B. nancyae</i> Smith	1958c: 928
<i>Callistodermatium</i>	<i>C. violascens</i> Singer	1981a: 506
<i>Callistosporium</i>	<i>Gymnopilus palmarum</i> Murr.	1944a: 363
<i>Cantharellula</i>	<i>Cantharellus umbonatus</i> Gmelin:Fr.	1936e: 281
<i>Chaetocalathus</i>	<i>Agaricus craterellus</i> Dur. & Lév.	1942a: 518
<i>Cheimonophyllum</i>	<i>Agaricus candidissimus</i> Berk. & Curt.	1955f: 417
<i>Coprinites</i>	<i>C. dominicana</i> Poinar Jr. & Singer	1990f: 1099
<i>Cyptotrampa</i>	<i>C. macrobasidium</i> Singer	1960a: 375
<i>Cystangium</i>	<i>Secotium sessile</i> Masseé & Rodway ex Rodway	1960h: 67
<i>Cystoagaricus</i>	<i>Nolanea strobilomyces</i> Murr.	1947b: 85
<i>Cystolepiota</i>	<i>C. constricta</i> Singer	1951e: 281
<i>Dennisiomyces</i>	<i>D. glabrescentipes</i> Singer	1955d: 225
<i>Descolea</i>	<i>D. antarctica</i> Singer	1950i: 256
<i>Diacanthodes</i>	<i>Daedalea philippinensis</i> Pat.	1945c: 141
<i>Endolepiotula</i>	<i>E. ruizlealii</i> Singer	1963a: 260
<i>Epicnaphus</i>	<i>E. phalaropus</i> Singer	1960f: 274, 279
<i>Gerronema</i>	<i>G. melanomphax</i> Singer	1951b: 599
<i>Gloeocantharellus</i>	<i>Cantharellus purpurascens</i> Hesler	1945c: 140
<i>Heimiomyces</i>	<i>Agaricus (Collybia) rheicolor</i> Berk. & Curt.	1942c: 127
<i>Hiatulopsis</i>	<i>Lepiota amara</i> Beeli	1967c: 364
<i>Hybogaster</i>	<i>H. giganteus</i> Singer	1964a: 13
<i>Hygroaster</i>	<i>H. nodulisporus</i> Dennis	1955f: 370
<i>Hygrotrampa</i>	<i>H. dennisianum</i> Singer	1958d: 221
<i>Hypsizygus</i>	<i>Pleurotus tessulatus</i> (Bull.:Fr.) Gill.	1947b: 77
<i>Kuehneromyces</i>	<i>Pholiota mutabilis</i> Schaeff.:Fr.	1946d: 504
<i>Lactocollybia</i>	<i>Collybia lacrimosa</i> Heim	1951e: 177
<i>Lampteromyces</i>	<i>Pleurotus japonicus</i> Kawamura	1947b: 79
<i>Leucoagaricus</i>	<i>Leucocoprinus macrorrhizus</i> Locquin	1948c: 35
<i>Leucoinocybe</i>	<i>Mycena lenta</i> Maire	1943a: 144
<i>Linderomyces</i>	<i>Paxillus lateritius</i> Petch	1947d: 157
<i>Lulesia</i>	<i>Armillariella densifolia</i> Singer in Singer & Digilio	1970a: 16
<i>Macrolepiota</i>	<i>Lepiota procera</i> Scop.:Fr.	1946g: 141
<i>Macrometrula</i>	<i>Agaricus rubriceps</i> Cooke & Mass.	1948a: 264
<i>Manuripia</i>	<i>M. bifida</i> Singer	1960f: 273, 279
<i>Mycenella</i>	<i>Mycena (Mycenella) margaritispota</i> Lange	1938e: 9
<i>Mycocalvimia</i>	<i>M. theobromicola</i> Singer	1981a: 504
<i>Neoclitocybe</i>	<i>Omphalia byssiseda</i> Bres.	1961b: 55
<i>Neohygrophorus</i>	<i>Hygrophorus angelesianus</i> Smith & Hesler	1961b: 46
<i>Neopaxillus</i>	<i>N. echinosporus</i> Singer	1948a: 262
<i>Neosecotium</i>	<i>Secotium macrosporum</i> Lloyd	1960e: 154
<i>Nivatogastrium</i>	<i>Secotium nubigenum</i> Harkness	1959g: 224
<i>Nothoclavulina</i>	<i>N. ditopa</i> Singer	1970a: 18
<i>Nothopanus</i>	<i>Agaricus (Pleurotus) eugrammus</i> Mont.	1944a: 364
<i>Pachylepyrium</i>	<i>Phaeomarasmium fulvidula</i> Sing. in Sing. & Digilio	1957h: 321
<i>Palaeocephala</i>	<i>Marasmius cymatelloides</i> Dennis & Reid	1961b: 60
<i>Panaeolopsis</i>	<i>P. sanmartiniana</i> Singer	1969a: 367
<i>Pegleromyces</i>	<i>P. collybioides</i> Singer	1981a: 500
<i>Phaeogyroporus</i>	<i>Boletus braunii</i> Bres.	1944a: 360
<i>Phellinites</i>	<i>P. degiustoi</i> Singer & Archangelsky	1957e: 41
<i>Phylloboletellus</i>	<i>P. chloephorus</i> Singer	1951e: 438
<i>Phyllobolites</i>	<i>Paxillus miniatus</i> Rick	1942b: 59
<i>Physocystidium</i>	<i>Collybia cinnamomea</i> Dennis	1962b: 410

TABLE 1. Continued.

Genus	Type species basionym	Citation with page no.*
<i>Pleurocollybia</i>	<i>Collybia (Gymnopus) praemultifolia</i> Murr.	1947b: 80
<i>Pleurocybella</i>	<i>Pleurotus prorigens</i> Pers.:Fr.	1947b: 81
<i>Pleuroflammula</i>	<i>Crepidotus dussii</i> Pat.	1946d: 521
<i>Pleuromykenula</i>	<i>P. ellipsoidea</i> Singer	1973d: 27
<i>Podabrella</i>	<i>Agaricus microcarpus</i> Berk. & Br. <i>sensu</i> Hoehn.	1945c: 143
<i>Porpoloma</i>	<i>P. sejunctum</i> Singer	1952c: 197, 198
<i>Psiloboletinus</i>	<i>Phylloporus lariceti</i> Singer	1945b: 250
<i>Pyrrhoglossum</i>	<i>Agaricus (Crepidotus) pyrrhys</i> Berk. & Curt.	1944a: 367
<i>Rajapa</i>	<i>Agaricus eurhizus</i> Berk.	1945c: 142
<i>Resinomyceia</i>	<i>Agaricus rhododendri</i> Peck	1981b: 151
<i>Rhodarrhenia</i>	<i>Merulinus pezizoides</i> Speg.	1964b: 142
<i>Ripartitella</i>	<i>Marasmius squamosidiscus</i> Murr.	1947b: 85
<i>Scytinopogon</i>	<i>Pterula pallescens</i> Bres.	1945c: 139
<i>Smithiomyces</i>	<i>Leucomyces mexicanus</i> Murr.	1944a: 366
<i>Strobilurus</i>	<i>Agaricus conigenoides</i> Ellis	1962b: 409
<i>Thaxterogaster</i>	<i>T. magellanicum</i> Singer	1951c: 216
<i>Veloporphyrellus</i>	<i>V. pantoleucus</i> Gómez & Singer	1984f: 293
<i>Weraroa</i>	<i>Secotium novaezealandiae</i> Cunningham	1958b: 46
<i>Xanthoconium</i>	<i>Gyroporus stramineus</i> Murr.	1944a: 361
<i>Xerulina</i>	<i>Lentinus chrysopeplus</i> Berk. & Curt.	1961b: 59
<i>Zelleromyces</i>	<i>Zelleromyces cinnabarina</i> Singer & Smith	1960h: 18

\* See Chapter 4, this volume, for complete citations.

TABLE 2. Type localities and numbers of Singer's new taxa.

Afghanistan	2	England	2	New Zealand	1
Antarctica	4	Finland	10	Nicaragua	2
Argentina	544	France	1	Panama	18
Australia	9	Germany	4	Peru	12
Austria	20	Guadeloupe	3	Philippines	3
Belize	4	Guiana	2	Scotland	1
Bolivia	206	Henderson Islands	3	South Africa	1
Br. West Indies	1	Honduras	2	Spain	27
Brazil	378	India	8	Switzerland	15
Cambodia	1	Indonesia	3	Trinidad	7
Canada	5	Italy	1	Uganda	1
Chile	198	Japan	5	Uruguay	3
China	4	Liberia	10	USA	279
Colombia	113	Madagascar	1	USSR	127
Costa Rica	66	Martinique	1	Venezuela	39
Cuba	2	Mexico	116	Vietnam	2
Czechoslovakia	22	Netherlands	1	Zaire	42
Dominican Republic	1	New Guinea	3	Zimbabwe	1
Ecuador	82	New Caledonia	2	Unknown	31

TABLE 3. Herbaria with holdings of Singer's type specimens.\*

BAFC	275	INPA	223	Patouilla	1
BPI	3	K	20	R	2
BR	34	KAZ	1	RPC	1
BUF	1	Kohlmeyer	1	Ruiz Leal	3
DAOM	3	L	2	S	14
ENCB	4	LAU	2	SAM	2
F	597	LE	93	SGO	123
FH	113	LIL	567	SP	1
FRI	2	MEDEL	1	TENN	1
Favreano	1	MICH	142	UNC	1
H	1	NY	66	W	4
HUA	2	PC	1	WU	13
IA	3	PR	1	Unknown†	141
IAA	2	PUN	2		

\* When two herbaria are cited in Singer's publication, both are counted as having the type specimen. Herbarium abbreviations are from *Index Herbariorum* (Holmgren et al., 1990).

† Most are pre-1958, before designation of type specimen was mandatory.